Proposed Plan

For Groundwater and Soil Contamination Cleanup

Public Meeting: April 5, 2005, 5-8 p.m. (Tuesday)
Sunset Junior High School
1610 North 250 West, Sunset
(See map on back cover)

Public Comment Accepted: Mar 22, 2005 to Apr 20, 2005
Written Comment Accepted: Postmarked by Apr 20, 2005

Operable Unit 5
Hill Air Force Base, Utah

Public Comment on Proposed Plan for Contamination Cleanup

Hill Air Force Base (Hill AFB) is requesting public comment on its Proposed Plan for cleanup of shallow groundwater and soil contamination at Operable Unit 5 (OU 5). Operable Unit 5 is one of twelve operable units at Hill AFB that has been investigated to determine the extent of contamination, and is located in the northwest region of Hill AFB near the cities of Sunset, Clinton, and Roy, Utah (as shown on Figure 1). *The remedial alternatives in this Proposed Plan have been prepared for soil and groundwater contamination only. Indoor air issues in off-Base areas are being addressed separately as part of the ongoing Basewide Indoor Air Program that has been approved by the United States Environmental Protection Agency (EPA) and Utah Department of Environmental Quality (UDEQ), following the Final Action Memorandum for Time-Critical Removal Actions for Indoor Air (Hill AFB, 2003).* This Proposed Plan is based on findings from the Remedial Investigation (MWH, 2003), Feasibility Study (MWH, 2004), and Baseline Risk Assessment (which is included in the Remedial Investigation report for OU 5). The Remedial Investigation (RI) report describes the remedial investigations that occurred at OU 5 between 1993 and 2003 and includes the site conceptual model and the nature and extent of contamination. The Feasibility Study (FS) report presents an evaluation of the remedial processes that were evaluated for cleanup of groundwater contamination at OU 5 and the soil contamination within the on-Base Tooele Army Rail Shop (TARS) area. The remedial alternatives in the FS were assembled and evaluated according to EPA guidance, and are applicable to OU 5. The Baseline Risk Assessment identifies the risk of the contamination to human health and the environment. Residents and interested parties are encouraged to read and comment on this Proposed Plan. Additionally, residents are encouraged to reference the RI/FS reports and the Baseline Risk Assessment for specific details that are not included in the Proposed Plan. The referenced reports are included in the Administrative Record at locations listed on the back cover of this document.

Under the Federal Facility Agreement between Hill AFB, the EPA, and UDEQ, the final selection of remedial alternatives for OU 5 will be jointly selected only after considering all public comments. Hill AFB will consider all verbal and written comments and prepare a response to each comment. A summary of the comments and responses will accompany the Record of Decision (ROD) for OU 5. Hill AFB may modify the preferred alternative(s), select different alternatives than presented in this Proposed Plan, or select more appropriate alternatives on the basis of new information or public comment.

Address written comments to:

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Hours: M-F, 7:30am - 4:30pm (by appointment)

Site Background

Hill AFB is located in northern Utah, approximately 30 miles north of Salt Lake City and 5 miles south of Ogden. Since 1934, Hill AFB has served as a key part of the nation's defense in repairing and maintaining aircraft and other weapon systems. The industrial operations to perform this work required the use of numerous chemicals and generated various waste products. For many years, chemicals and their associated waste products were disposed in chemical disposal pits and landfills, or leaked from tanks and pipes. Since the 1970s, as environmental laws and regulations were passed, Hill AFB has changed its procedures to reduce or eliminate its use of numerous chemicals, and has developed better waste management, storage, and disposal procedures. Today, hazardous wastes generated at the Base are treated and disposed in accordance with the stringent State and Federal requirements adopted by regulatory agencies in recent years.

Operable Unit 5 includes two shallow groundwater contaminant *plumes* that originate from the Base and extend off-Base in a westerly direction beneath the cities of Clinton,

Plume:

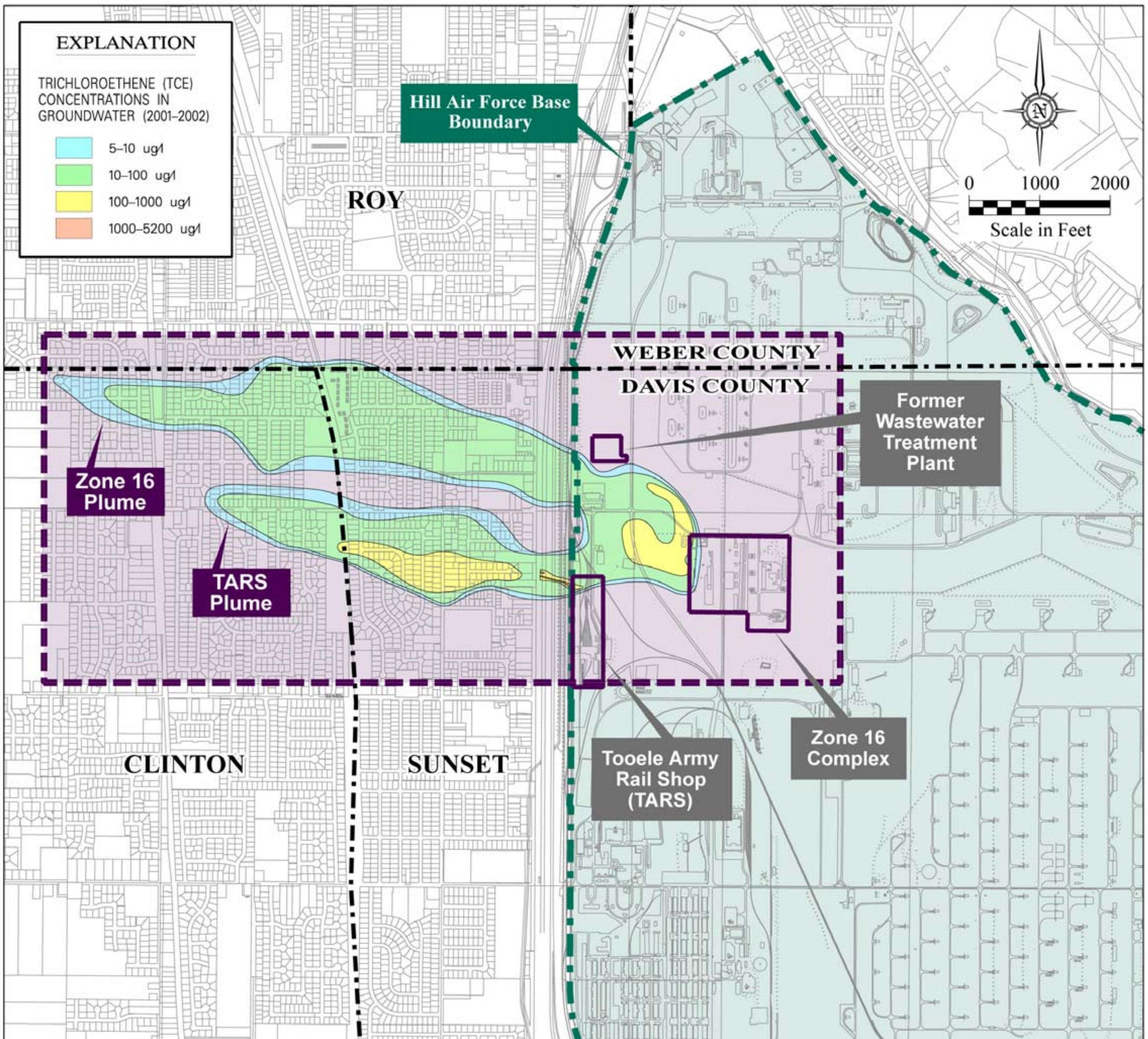
A volume of groundwater believed to be contaminated. In this case, it is the area in which groundwater contamination exceeds State or Federally mandated Maximum Contaminant Levels.

Sunset, and Roy. The groundwater contamination plumes are referred to as the TARS plume (southernmost) and the Zone 16 plume (northernmost), in reference to their source areas (see Figure 1). Operable Unit 5 also includes an area of arsenic-contaminated soil located on-Base in the TARS area (see Figure 1).

Potential Source Areas and Contaminant Migration

Potential source areas for groundwater contamination include the TARS area, the Zone 16 Complex, and a former Wastewater Treatment Plant located on-Base (see Figure 1). The TARS area is a locomotive service and maintenance facility that began operation in the 1940s. The Zone 16 Complex is a series of buildings currently used for munitions storage. The Zone 16 Complex was originally used for small arms repair (in the 1940s), and later became a loading and assembly plant. The former Wastewater Treatment Plant may also have been a source of contamination for the Zone 16 plume. The TARS, Zone 16, and Wastewater Treatment Plant source areas were investigated extensively during the remedial investigation phase, and the contaminants found in the

FIGURE 1. Location of Operable Unit 5, Hill Air Force Base



groundwater contamination plumes were not detected in soil at concentrations above EPA Region III Risk Based Screening Levels. However, in the TARS area, arsenic was detected in the shallow surface soil at concentrations above a risk-based cleanup level. Refer to the TARS soil section (on page 16) for further details regarding the arsenic contamination in soil.

Several chemicals were used in the industrial processes during the operation of these facilities (such as degreasing solvents), and contaminants have migrated from their point of release down through the soil to the shallow groundwater system. The upper portion of the shallow groundwater system (including the contaminated zone) ranges in depth from ground surface to 100 feet below ground surface and is comprised primarily of sand and silt. A low-permeability clayey silt layer exists beneath the upper portion of the shallow groundwater system. The low-permeability layer is several hundred feet thick and prevents the contaminants in the shallow groundwater system from reaching the drinking water aquifer, which is located at depths greater than 400 feet in this area beneath Hill AFB and off-Base areas.

Groundwater and Soil Investigations

Groundwater. Shallow groundwater quality in the OU 5 area has been investigated since the early 1990s, and results from groundwater quality investigations have been evaluated against drinking water standards set by Federal agencies and the State of Utah. Although not used as a drinking water source, shallow groundwater in the OU 5 area has formally been designated as a potential drinking water source by the State of Utah, therefore Federal and State drinking water standards apply for setting cleanup goals. The primary contaminants detected during the remedial investigation were volatile organic compounds (VOCs). The highest concentrations detected for each of these compounds detected in the TARS groundwater plume and the Zone 16 groundwater plume areas in both on- and off-Base areas are presented in Table 1. For comparison, the Federal Maximum Contaminant Levels and Utah State Groundwater Quality Standards for each compound are listed. The volatile organic compounds that exceeded their maximum contaminant levels are: trichloroethene (TCE) 1,1-dichloroethene (1,1-DCE), 1,1,1-trichlorethane (1,1-TCA), carbon tetrachloride, cis-1,2-dicholorethene (cis-1,2-DCE), tetrachloroethene (PCE), and vinyl chloride. The most widespread contaminant at OU 5 is TCE, a chlorinated solvent that was commonly used by Hill AFB to clean parts during equipment manufacture and maintenance. A map of the OU 5 TCE groundwater plumes is presented in Figure 1. Only the TCE plumes are presented because all other volatile organic compounds are located within the bounds of the TCE plumes. Concentrations of TCE in off-Base areas were lower than those reported on-Base.

Soil. Several soil investigations were performed in the suspected source areas at OU 5. Most chemical analyses of the soil samples resulted in no detections or trace-level detections of contaminants. Trace metals (including arsenic, cadmium, chromium, mercury, lead, and zinc) were detected primarily in the TARS area. Of the trace metals detected, only arsenic was determined to pose a

TABLE 1. Primary Contaminants in Groundwater and Maximum Concentrations Detected On- and Off-Base

Compounds	On-Base TARS Plume Maximum Concentrations (ppb)	Off-Base TARS Plume Maximum Concentrations (ppb)	On-Base Zone 16 Plume Maximum Concentrations (ppb)	Off-Base Zone 16 Plume Maximum Concentrations (ppb)	Federal Maximum Contaminant Level (ppb)	State Groundwater Quality Standard (ppb)
1.1-Dichloroethene	15	2	ND	ND	7	7
1,1,1-Trichloroethane	510	13	ND	ND	200	200
Carbon Tetrachloride	ND	ND	ND	49	5	NE
Cis-1,2-Dichloroethene	160	51	75	2	70	NE
Tetrachloroethene	ND	5	8	6	5	NE
Trichloroethene (TCE)	5200	490	411	56	5	5
Vinyl Chloride	ND	23	1.1	ND	2	2

ppb – parts per billion
NE – not established
ND – not detected

risk to human health for an on-Base TARS worker if the soil were to be ingested. The maximum concentration of arsenic detected was 203 milligrams per kilogram. The preliminary remediation goal is the exposure point concentration of 50.9 milligrams per kilogram, which is a risk-based cleanup level for industrial standards.

Risk Assessment

The EPA and UDEQ provide guidelines for evaluating risks to human health and the environment. Potential risks to human health in relation to contamination at OU 5 were evaluated in the Baseline Risk Assessment. Under the current off-Base land use, there are no immediate human health risks that require remediation, because the groundwater is not used as a source of drinking water. However, the Baseline Risk Assessment determined that future risks could present a potential hypothetical threat to human health if shallow groundwater were used for drinking water. Additionally, for soil on-Base, the Baseline Risk Assessment determined that potential risks were possible to TARS workers, if they were to ingest soil containing elevated levels of arsenic. Risks to the environment were also evaluated, considering both aquatic and terrestrial habitats. It was determined that groundwater contaminants did not pose an unacceptable risk to wildlife or the environment.

Remedial Action Objectives

Based on the remedial investigation and risk assessment results, Remedial Action Objectives were developed for remediation of both groundwater and soil.

Groundwater. The Remedial Action Objectives for groundwater are to restore groundwater to contaminant concentration levels below the State and Federal Maximum Contaminant Levels for drinking water within approximately 20 to 40 years, prevent further migration of the plume to the extent practicable, and prevent unacceptable human exposure to contaminated groundwater.

Soil. The Remedial Action Objective for soil is to prevent human exposure to contaminated soil above Preliminary Remediation Goals. The Preliminary Remediation Goal for soil is the risk-based exposure point concentration of 50.9 milligrams per kilogram for arsenic, which is a risk-based level for industrial standards.

Selection/Evaluation Criteria

This Proposed Plan has been prepared in fulfillment of the U.S. Air Force's public participation responsibilities under Sections 113(k) and 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (commonly known as "Superfund"). Multiple remedial alternatives for each area of contamination (TARS plume, Zone 16 plume, and TARS soil contamination) have been developed. To compare the relative performance of each remedial alternative, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) requires that each remedial alternative be evaluated against nine criteria (as presented in Table 2). The remedial alternatives have been reviewed, and a preferred alternative for each area of contamination has been selected with the oversight and concurrence of the EPA and UDEQ.

TABLE 2. NCP Evaluation Criteria	
1	**Overall Protection of Human Health and the Environment** Will the alternative protect human health and the environment against unacceptable risk?
2	**Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)** Does the alternative comply with all existing laws and regulations? (ARARs are defined as State and/or Federal regulations applicable to, or relevant and appropriate for, a particular site. Selected remedial alternatives must meet ARARs criterion, or grounds for obtaining a waiver must be provided.)
3	**Long-Term Effectiveness and Permanence** Will the alternative provide a permanent, long-term solution to the problem?
4	**Reduction in Toxicity, Mobility, and Volume through Treatment** Will the alternative reduce the toxicity and volume of the contaminants, and reduce their ability to migrate?
5	**Short-Term Effectiveness (Impact on Community)** What impact would implementing the alternative have on the community and workers?
6	**Implementability** Can the alternative be practically and successfully implemented, considering any technical and administrative issues that may need to be addressed?
7	**Cost** What is the cost to design, build, and operate the system for 30 years?
8	**State Acceptance** Does the Utah Department of Environmental Quality accept, oppose, or have comment on the alternative? (This stage occurs following public comment and State evaluation.)
9	**Community Acceptance** Evaluates the community's preferences for, or concerns about, the alternative. (This stage occurs upon receiving public comment.)

TARS Groundwater

> **Parts Per Billion:**
> A concentration term for one part of a contaminant per billion parts of water.

The TARS plume, as defined by TCE exceeding its Maximum Contaminant Level of 5 *parts per billion (ppb)*, is approximately 5,400 feet in length, extending from its source area in the TARS to approximately 890 West Street in Clinton (see Figure 2). The maximum TCE concentration detected on-Base was 5,200 ppb, whereas the maximum concentration detected off-Base was 490 ppb. Groundwater investigations to determine the nature and extent of the TARS plume included extensive use of cone penetration testing and direct push groundwater sampling. Cone penetration testing was performed at over 250 locations and over 700 direct-push groundwater samples were collected from the TARS and Zone 16 plumes. Additionally, over 105 monitoring wells have been installed to monitor the TARS plume. Groundwater monitoring at these well locations is used to provide data for evaluating contaminant time series trends. In general, time series for monitoring wells located near the source area have displayed highly fluctuating TCE concentrations through time, whereas monitoring wells immediately downgradient of the Phase I aeration curtain (the description of this remedial system is provided below) show large decreases in TCE concentrations through time. Monitoring wells in the middle of the plume generally show little apparent trend in TCE concentrations through time. Monitoring wells located near the leading edge of the TARS plume have had slightly increasing TCE concentrations through time, prior to the installation of the Phase III groundwater containment system (the description of this remedial system is provided below). Water-level monitoring also is performed monthly to determine groundwater flow directions and changes in water table depth. The depth-to-groundwater ranges from approximately 25 feet below ground surface near the TARS source area on-Base to less than 5 feet below ground surface near the leading edge of the plume off-Base. Other tasks that were performed as part of the groundwater investigations include: a historic site review, field drain sampling, aquifer testing, residential surveys including indoor air and water sampling, soil-gas surveys, TCE batch sorption studies, an enhanced biodegradation study, a groundwater tracer study, and groundwater flow and contaminant transport modeling. The specific findings from each of these studies are summarized in the OU 5 RI report (see back cover for information on obtaining documentation).

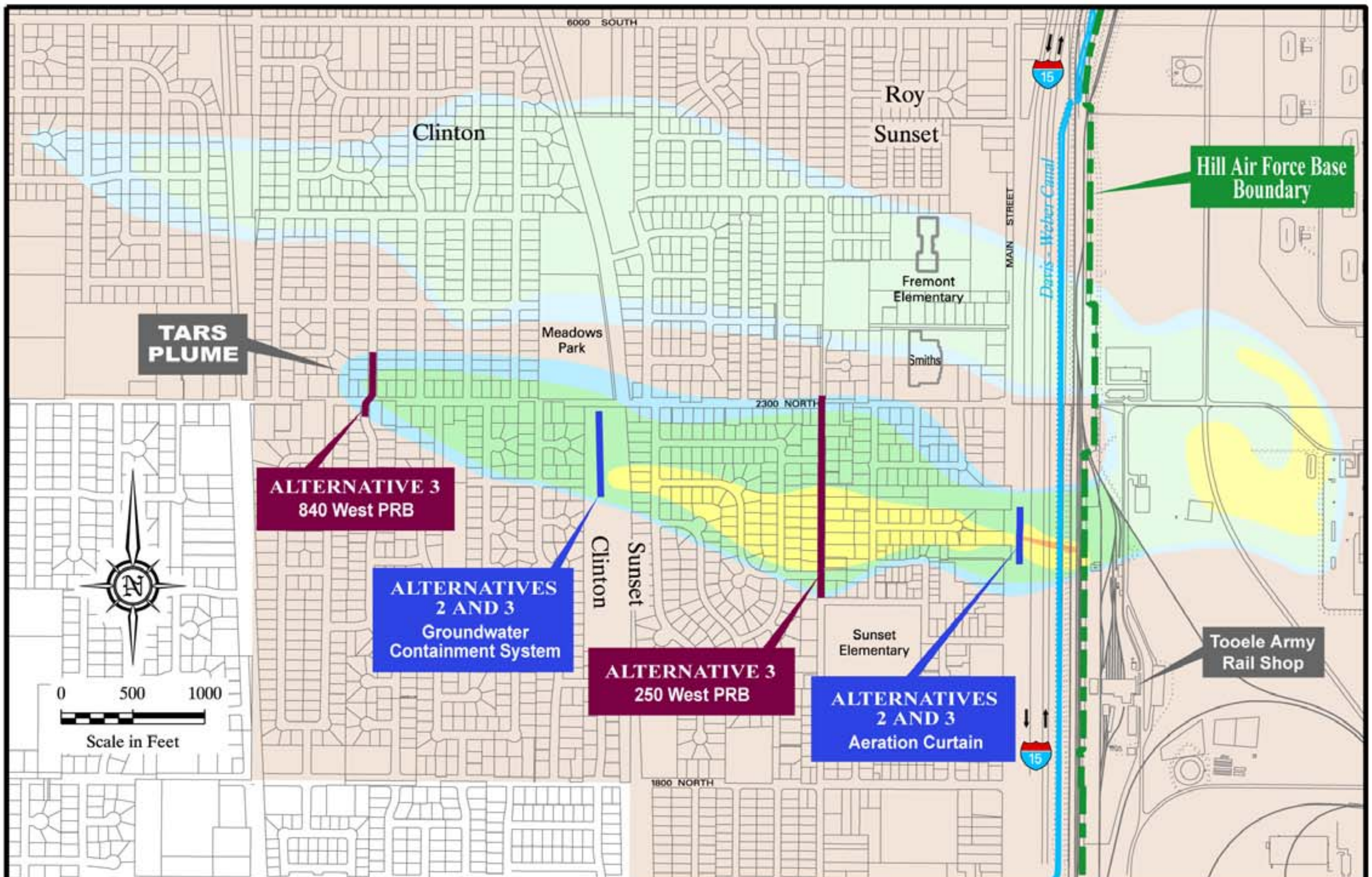
Groundwater Investigation

Existing Remedial Actions

Two early remedial actions are currently in operation in the TARS groundwater plume, including the Phase I aeration curtain system (see photo on page 8) and the Phase III groundwater containment system (see photos on pages 11 and 16). The Phase I aeration curtain system is located on Main Street in Sunset and has been operating since 1997. The system consists of a 30-foot deep gravel-filled trench that extends 400 feet across part of the TARS plume. The system "aerates" the groundwater and causes TCE to volatize out of the water and into the air. The system has had positive impact on cleanup of TCE in groundwater, and it prevents higher concentrations of TCE in the upgradient source area from migrating into Sunset. Groundwater monitoring of over 105 wells in the OU 5 TARS plume, including wells near the Phase I aeration curtain, have shown that the system is effective in reducing TCE concentrations in the groundwater.

The Phase III groundwater containment system is located near the boundary between Clinton and Sunset, and has been operating since 2003. The system includes a 35-foot deep, gravel-filled extraction trench that extends 600 feet across most of the TARS plume. The pumping

FIGURE 2. TARS Groundwater Remedial Alternatives



ALTERNATIVE 1

Operation of the Phase I aeration curtain and the Phase III containment system would be discontinued and institutional controls currently in place for the site would not be renewed to manage associated risks. The TCE plume would continue to naturally attenuate, but monitoring of TCE concentrations would not be documented, and there would be no mechanism in place to determine when cleanup goals are achieved. Cleanup time frames are estimated to be greater than 100 years. There would be minimal costs associated with decommissioning the existing remedial systems.

Construction Cost $75,000	O&M Cost* None	Present Worth** $75,000

ALTERNATIVE 2

Operation of the existing Phase I aeration curtain and Phase III groundwater containment system would continue until cleanup goals are achieved. Institutional controls restricting the use of shallow groundwater would be renewed. Cleanup time frames are estimated to be approximately 30 years.

Construction Cost None	O&M Cost* $306,000	Present Worth** $5,720,000

ALTERNATIVE 3

Operation of the existing Phase I aeration curtain and Phase III groundwater containment system would continue until cleanup goals are achieved. Institutional controls restricting the use of shallow groundwater would be renewed. Additionally, permeable reactive barriers would be constructed at two locations. Cleanup times are estimated to be approximately 20 to 30 years.

Construction Cost $4,150,000	O&M Cost* $500,000	Present Worth** $10,200,000

TRICHLOROETHENE (TCE) CONCENTRATIONS IN GROUNDWATER (2002-2003)

- 5-10 ppb
- 10-100 ppb
- 100-1000 ppb
- 1000-5200 ppb

PRB Permeable Reactive Barrier

TARS Tooele Army Rail Shop

Institutional Controls: groundwater use restrictions (applicable only to Alternatives 2 and 3)

ppb Parts per billion

* *Annual O&M Cost (includes replacement of the Phase I aeration curtain in approximately 2015)*
** *Calculated as 30 Year Present Worth*

system captures groundwater contaminated with TCE and prevents further migration of the plume into Clinton. Groundwater extracted from the trench is sent to the sanitary sewer for treatment at the North Davis Sewer District's wastewater treatment plant in accordance with the agreement between Hill AFB and the treatment plant. Groundwater monitoring near the Phase III groundwater containment system indicates that the system is effective in containing TCE contaminated groundwater.

Institutional Controls

> ***Institutional Controls:***
> Regulatory restrictions that, in this case, limit the use of contaminated groundwater and/or restrict land use.

Through *institutional controls*, the State of Utah Division of Water Rights (UDWR) in coordination with Hill AFB has restricted the domestic use of shallow groundwater within off-Base areas of OU 5. This restriction provides the UDWR legal authority to restrict use of shallow groundwater within OU 5, including disallowing installation of any new water supply wells. The specific institutional controls are as follows.

Groundwater Off-Base. The State of Utah enforces groundwater institutional controls off-Base. For areas in OU 5 where shallow groundwater contains contaminants above Maximum Contaminant Levels, use of groundwater is restricted following the Ground-Water Management Plan for the Weber Delta Sub-Area of the East Shore Area (UDWR, 1995). These include groundwater drilling permit restrictions that restrict installation of new wells in areas covered by the institutional controls. The institutional controls are registered through the State Engineer's Office and the UDWR. Hill AFB will send the UDWR a memorandum and map with updated groundwater contamination information on an annual basis to verify that the institutional controls are maintained. Additionally, water right inspections will be performed as part of a 5-year review by Hill AFB using the State's database to confirm that new water rights have not been granted in the areas where groundwater exceeds Maximum Contaminant Levels.

Groundwater On-Base. On-Base, additional institutional controls are implemented through Continuing Order AFI 32-7020 (Hill AFB supplement 1, 29 April 1998) that states that no construction or other activity will disturb groundwater in the restricted areas. Hill AFB will distribute a Restricted Areas Use Map to departments across the Base and will update and re-distribute the map as necessary. In addition, Hill AFB will review all completed 322 Process Forms for construction activities proposed in these restricted areas. Annual institutional control audits including visual inspections will be used to access compliance with institutional controls.

TARS Groundwater Alternatives

There are three remedial alternatives presented in this Proposed Plan for the TARS groundwater plume. The alternatives are described and illustrated in Figure 2. TARS Alternative 1 is a "no action" alternative (required by the NCP) and is provided as a baseline for comparison to the other alternatives.

TARS Alternative 1. No Action. Under this Alternative, operation of the Phase I aeration curtain and the Phase III groundwater containment system would be discontinued and institutional controls currently in place for the site would not be renewed to restrict the use of contaminated groundwater and associated risks. Under this alternative, *natural attenuation* of the TCE plume would continue, but monitoring of TCE concentrations in the groundwater would not be documented, and there would be no mechanism in place to determine when cleanup goals are achieved. Cleanup time frames under this alternative are estimated to be greater than 100 years. There would be minimal costs associated with decommissioning the existing remedial systems under this alternative (see Figure 2).

> ***Natural Attenuation:***
>
> Naturally occurring physical, chemical, and biological processes such as biodegradation, dilution, dispersion, and volatilization, that over time clean up contaminants.

TARS Alternative 2. Operation of Existing Remedial Systems. Under this alternative, the operation of the existing Phase I aeration curtain and Phase III groundwater containment system would continue until cleanup goals are achieved. Institutional controls restricting the use of shallow groundwater would be renewed. The cleanup time frames under this alternative are estimated to be approximately 30 years.

TARS Alternative 3. Operation of Existing Remedial Systems and Installation of Permeable Reactive Barriers. Under this alternative, the operation of the existing Phase I aeration curtain and Phase III groundwater containment system would continue until cleanup goals are achieved. Institutional controls restricting the use of shallow groundwater would be renewed. Additionally, Alternative 3 includes the construction of *permeable reactive barriers* at two locations (250 West in Sunset and 840 West in Clinton, as shown on Figure 2). The cleanup time frames under this alternative are estimated to be approximately 20 to 30 years.

> ***Permeable Reactive Barrier:***
>
> A mixture of sand and iron grains placed below ground surface that destroy contamination as groundwater passes naturally through the barrier.

In both TARS Alternatives 2 and 3, it is assumed that the Phase I aeration curtain will need to be replaced in approximately 10 years due to age. It is also assumed that water pumped from the Phase III groundwater containment system is discharged untreated to the sanitary sewer for treatment at the North Davis Sewer District's wastewater treatment plant. Alternatives 2 and 3 also include ongoing groundwater sampling to monitor projected contaminant concentration declines through time.

Evaluation Criteria – Comparison of TARS Alternatives

The three remedial alternatives for the TARS groundwater plume were compared against the evaluation criteria presented in Table 2. A summary of the evaluation is described below and highlighted and summarized in Table 3.

Protectiveness. TARS Alternative 1 does not provide overall protection because of the lack of institutional controls that restrict the use of groundwater, and further degradation of groundwater would occur because the operation of the Phase I aeration curtain and the Phase III groundwater containment system would discontinue. Alternatives 2 and 3 include institutional controls and are therefore more protective than Alternative 1. Based on groundwater modeling, Alternative 3 provides a slightly faster cleanup time frame than Alternative 2 (by approximately 5 to 10 years for areas west of 250 West in Sunset), and both Alternatives 2 and 3 have much faster cleanup times than Alternative 1.

Applicable or Relevant and Appropriate Requirements (ARARs). The ability to comply with groundwater quality regulations is a main differentiator between alternatives. Alternative 1 will not comply with ARARs because groundwater cleanup goals are not achieved in a reasonable time frame, and the plume would continue to expand and cause further degradation of groundwater without the Phase I aeration curtain and the Phase III groundwater containment system. Alternatives 2 and 3 eventually comply with ARARs because groundwater cleanup goals would be achieved in a reasonable time frame.

TABLE 3
TARS Groundwater Evaluation of Remedial Alternatives

	TARS GROUNDWATER	Alternative 1	Alternative 2	Alternative 3
NCP EVALUATION CRITERIA	1 Protectiveness	Does Not Meet Criteria	Meets Criteria	Meets Criteria
	2 Compliance with ARARs	Does Not Meet Criteria	Meets Criteria	Meets Criteria
	3 Long-Term Effectiveness and Permanence	Does Not Meet Criteria	Meets Criteria	Meets Criteria
	4 Reduction in Toxicity, Mobility, Volume	Does Not Meet Criteria	Meets Criteria	Meets Criteria
	5 Short-term Effectiveness	Meets Criteria	Meets Criteria	May Meet Criteria
	6 Implementability	May Meet Criteria	Meets Criteria	May Meet Criteria
	7 Regulatory Acceptance	Does Not Meet Criteria	Meets Criteria	Meets Criteria
	8 Community Acceptance	Criteria Not Evaluated	Criteria Not Evaluated	Criteria Not Evaluated
	9 Cost ($million)	0.075	5.7	10.2
	Estimated Time to Cleanup	100+ years	30 years	20-30 years

Meets Criteria · May Meet Criteria · Does Not Meet Criteria · Criteria Not Evaluated

There are several ARARs for groundwater contamination at the TARS plume, including the following:

Corrective Action Clean-up Standards - UST and CERCLA sites (UAC R311-211). This standard lists general criteria to consider in establishing cleanup standards, including compliance with Maximum Contaminant Levels in the Federal Safe Drinking Water Act and Clean Air Act. It requires that the action to be taken is protective, and requires source removal or control of the source to prevent further degradation of the environment.

Clean-up and Risk-Based Closure Standards - RCRA, UST, and CERCLA sites (UAC R315-101). This standard establishes requirements to support risk-based cleanup and closure standards at sites for which remediation or removal of hazardous constituents to background levels will not be achieved. The procedures in this rule also provide for continued management of sites for which minimal risk-based standards cannot be met, and requires removal or control of the source and non-degradation beyond existing contaminant levels.

Long-Term Effectiveness and Permanence. Alternative 1 does not provide long-term effectiveness because nothing would be done to prevent further degradation of groundwater and monitoring would not be performed to provide an indication of the contaminant concentrations. Alternatives 2 and 3 would be effective in remediation of the off-Base portion of the TARS plume and provide additional long-term effectiveness by renewal of institutional controls.

Reduction in Toxicity, Mobility, and Volume through Treatment. Alternative 1 does not provide any cleanup mechanism to reduce toxicity, mobility, or volume of the groundwater contamination. Alternatives 2 and 3 provide similar reduction of toxicity, mobility, and volume of groundwater contamination to each other, but Alternative 3 provides a slightly faster reduction through the use of permeable reactive barriers (by approximately 5 to 10 years for areas west of 250 West in Sunset).

Short-Term Effectiveness (Impact on Community). Alternative 1 does not present a short-term risk or impact on the community because no action is taken, but it is not protective of the environment. Alternative 2 presents little short-term risk because the Phase I aeration curtain and Phase III groundwater containment system are already installed, so the only additional action taken is groundwater sampling to monitor reductions in contaminant concentrations. Alternative 3 presents short-term risk to workers and the community during the construction of permeable reactive barriers in residential areas. The short-term risk would include traffic interruption/diversion, and some residents may need to be temporarily displaced during construction.

Implementability. Alternative 1 is not easy to implement because the operation of the existing Phase I aeration curtain and the Phase III groundwater containment system would be discontinued. Additionally, some decommissioning activities would have to occur in order to make this alternative feasible. Alternative 2 is easily implemented, both technically and administratively since all items proposed under this alternative are currently in place. Alternative 3 presents significant implementability issues related to construction since permeable reactive barriers have to be installed in residential streets that have high utility density.

Cost. Alternative 1 has minimal cost associated with decommissioning activities of the current remedial systems. Costs under Alternative 2 are greater than Alternative 1 because of the costs associated with ongoing groundwater sampling, and operation and maintenance of the Phase I aeration curtain and the Phase III groundwater containment system. Alternative 3 is the most expensive (nearly twice the cost of Alternative 2) due to expenses associated with the installation of permeable reactive barriers.

Regulatory Acceptance. The EPA and UDEQ have tentatively agreed with the preferred alternative (see discussion below). However, this is subject to change after considering public comments received on this Proposed Plan and until the final Record of Decision is signed for OU 5.

Community Acceptance. Public comment on this document will be evaluated to determine the community's acceptance of the preferred alternative, and documented in the Record of Decision for OU 5.

Preferred TARS Groundwater Alternative

Alternative 2 is the preferred alternative for the TARS groundwater plume when compared to Alternatives 1 and 3. Alternative 1 does not provide protectiveness because it does not include institutional controls to restrict the use of contaminated groundwater, groundwater cleanup goals are not achieved within a reasonable time frame, and groundwater sampling would not be continued in order to measure cleanup. Alternative 3 provides slightly faster remediation than Alternative 2 (by approximately 5 to 10 years for areas west of 250 West in Sunset), however permeable reactive barriers are expensive, and construction is disruptive to the community. The potential incremental benefits of Alternative 3 may not be worth the additional cost (nearly twice as much as Alternative 2).


Phase III Groundwater Containment System Building

Zone 16 Groundwater

The Zone 16 plume, as defined by TCE exceeding its Maximum Contaminant Level of 5 parts per billion, is approximately 9,400 feet in length, extending from its source area in the Zone 16 Complex to approximately 1220 West Street in Clinton (see Figure 3). Compared to the TARS plume, the Zone 16 plume has much lower TCE concentrations. The maximum TCE concentration detected in groundwater on-Base was 411 ppb, whereas the maximum concentration detected off-Base was 56 ppb. Groundwater investigations to determine the nature and extent of the Zone 16 plume included extensive use of Cone Penetration Testing and direct push groundwater sampling from discrete depth intervals of the aquifer. Additionally, over 120 monitoring wells were installed to monitor trends in the Zone 16 plume. At monitoring wells located near the source area, TCE concentrations are decreasing through time. In off-Base monitoring wells, TCE concentrations are showing stable to slightly decreasing trends through time. The depth-to-groundwater ranges from approximately 60 feet below ground surface near the Zone 16 Complex source area on-Base to approximately 5 feet below ground surface near the leading edge of the plume off-Base.

Existing Remedial Actions

Institutional controls to restrict the use of shallow groundwater have been implemented for the Zone 16 plume. Please refer to page 8 for further information on institutional controls. No other remedial actions have been implemented for the Zone 16 plume.

Zone 16 Alternatives

There are four remedial alternatives presented in this Proposed Plan for the Zone 16 groundwater plume. The alternatives are described and illustrated in Figure 3. Zone 16 Alternative 1 is a "no action" alternative and is provided as a baseline for comparison to the other alternatives.

Zone 16 Alternative 1. No Action. Under this Alternative, the institutional controls to restrict the use of shallow groundwater would not be renewed. The TCE plume would continue to attenuate naturally, but monitoring of TCE concentrations would not be performed, and there would be no mechanism in place to determine when cleanup goals are achieved. The cleanup time frames under this alternative are estimated to be approximately 35 years.

Zone 16 Alternative 2. Monitored Natural Attenuation. Under this alternative, groundwater sampling would be performed specifically for *monitored natural attenuation* processes to document that natural attenuation of groundwater contamination is occurring. Institutional controls to restrict the use of shallow groundwater would be renewed. The cleanup time frames under this alternative are estimated to be approximately 35 years.

> ***Monitored Natural Attenuation:***
> Pertains to monitoring naturally occurring physical, chemical, and/or biological processes to determine the natural reduction of contaminants in relation to remedial objectives or cleanup goals.

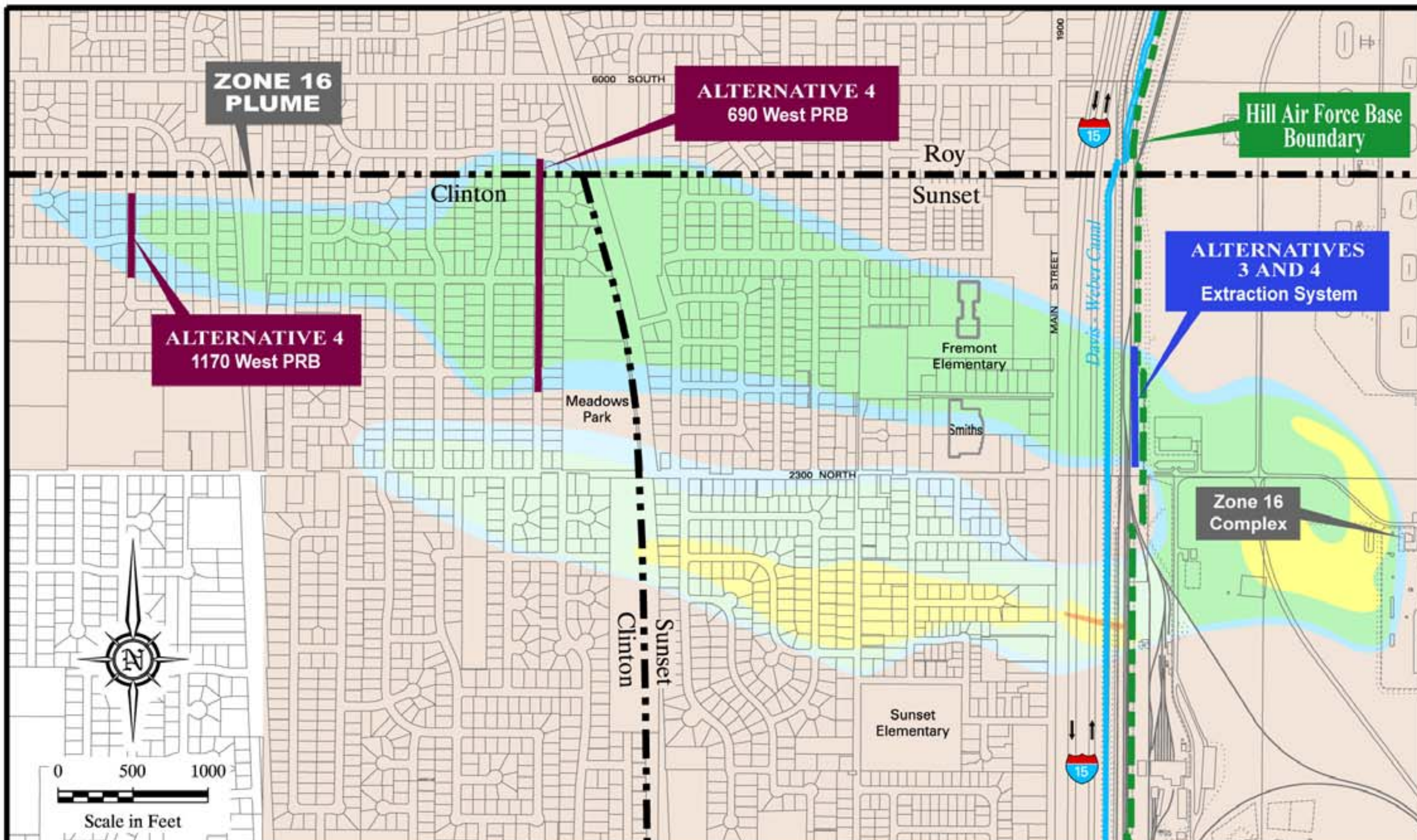
Zone 16 Alternative 3. Groundwater Extraction at the Base Boundary. Under this alternative, a groundwater extraction system consisting of extraction wells would be installed at the Base boundary, and extracted groundwater would be discharged untreated to the sanitary sewer for treatment at the North Davis Sewer District's wastewater treatment plant. Institutional controls restricting the use of groundwater would be renewed. The cleanup time frames under this alternative are estimated to be approximately 30 years.

Zone 16 Alternative 4. Groundwater Extraction at the Base Boundary and Installation of Permeable Reactive Barriers. Under this alternative, a groundwater extraction system consisting of extraction wells would be installed at the Base boundary (for both Alternatives 3 and 4), and extracted groundwater would be discharged untreated to the sanitary sewer for treatment at the North Davis Sewer District's wastewater treatment plant. Institutional controls restricting the use of groundwater would be renewed. Alternative 4 also includes the addition of two off-Base permeable reactive barriers (on 690 West and 1170 West in Clinton, as shown on Figure 3). The cleanup time frames under this alternative are estimated to be approximately 30 years. Permeable reactive barriers are explained on page 9.

Evaluation Criteria – Comparison of Zone 16 Alternatives

The four remedial alternatives for the Zone 16 groundwater plume were compared against the evaluation criteria presented in Table 2. A summary of the evaluation is described below and highlighted and summarized in Table 4.

FIGURE 3. Zone 16 Groundwater Remedial Alternatives



ALTERNATIVE 1

Institutional controls to restrict the use of shallow groundwater would not be renewed. The TCE plume would continue to attenuate naturally, but monitoring of TCE concentrations would not be documented, and there would be no mechansim in place to determine when cleanup goals are achieved. Cleanup time frames are estimated to be approximately 35 years.

Construction Cost	None	O&M Cost*	None	Present Worth**	None

ALTERNATIVE 2

Groundwater sampling would be performed specifically for monitored natural attenuation processes to document natural attenuation of the groundwater contamination. Institutional controls to restrict the use of shallow groundwater would be renewed. Cleanup time frames are estimated to be approximately 35 years.

Construction Cost	none	O&M Cost*	$90,000	Present Worth**	$1,750,000

ALTERNATIVE 3

A groundwater extraction system consisting of extraction wells would be installed at the Base boundary (for both Alternatives 3 and 4), and extracted groundwater would be discharged untreated to the sanitary sewer for treatment at the North Davis Sewer District's wastewater treatment plant. Institutional controls to restrict the use of groundwater would be renewed. Groundwater sampling would continue for approximately 30 years until cleanup goals are achieved.

Construction Cost	$1,331,000	O&M Cost*	$245,000	Present Worth**	$5,750,000

ALTERNATIVE 4

A groundwater extraction system consisting of extraction wells would be installed at the Base boundary (for both Alternatives 3 and 4), and extracted groundwater would be discharged untreated to the sanitary sewer for treatment at the North Davis Sewer District's wastewater treatment plant. Institutional controls to restrict the use of groundwater would be renewed. Alternative 4 includes the addition of two permeable reactive barriers off-Base. Groundwater sampling would continue for approximately 30 years until cleanup goals are achieved.

Construction Cost	$9,520,000	O&M Cost*	$300,000	Present Worth**	$14,900,000

TRICHLOROETHENE (TCE) CONCENTRATIONS IN GROUNDWATER (2002-2003)

- 5-10 ppb
- 10-100 ppb
- 100-1000 ppb
- 1000-5200 ppb

PRB Permeable Reactive Barrier

Institutional Controls: groundwater use restrictions (applicable only to Alternatives 2, 3, and 4)

ppb Parts per billion

* *Annual Cost*

** *Calculated as 30 Year Present Worth*

Protectiveness. Alternative 1 does not provide protectiveness because of the lack of institutional controls to restrict the use of shallow groundwater. All other alternatives include institutional controls and are more protective because they restrict the use of shallow groundwater. Alternatives 3 and 4 include groundwater pumping at the Base boundary; however, based on groundwater modeling it appears that pumping at a sufficient rate to achieve containment of the Zone 16 plume would cause substantial drawdown and could cause a change in the flow field of the adjacent TARS plume, thus changing the flow direction slightly to the north. This could cause some areas that are currently outside (north) of the TARS plume to become contaminated. Furthermore, the current remediation systems that are centered across the TARS plume would not be properly located if the plume shifts slightly to the north. For Alternative 3, remediation time frames (with the groundwater extraction system) are not substantially better than those of Alternative 2. Alternative 4 provides a slightly shorter time frame (approximately 5 years) for remediation of off-Base contaminants due to the installation of permeable reactive barriers.

Applicable or Relevant and Appropriate Requirements. The ability to comply with groundwater quality regulations is the main differentiator between alternatives. Alternative 1 does not comply with ARARs because institutional controls are removed, and therefore groundwater use would not be restricted. Alternatives 2, 3, and 4 comply with ARARs because institutional controls would be renewed and groundwater cleanup goals would eventually be achieved through natural attenuation and/or other remedial actions. There are several ARARs for groundwater contamination at the Zone 16 plume, including those listed for the TARS groundwater plume on page 10.

Long-Term Effectiveness and Permanence. Alternatives 2, 3, and 4 provide more long-term effectiveness than Alternative 1 through the implementation of institutional controls. Alternative 2 includes sample collection for monitored natural attenuation, and would provide data to document natural attenuation of contaminants. Pumping at the Base boundary in the Zone 16 plume, under Alternatives 3 and 4, would be effective in removal of contaminant mass; however the pumping could adversely impact the flow direction of the adjacent TARS groundwater plume,

TABLE 4
Zone 16 Groundwater Evaluation of Remedial Alternatives

	ZONE 16 GROUNDWATER	Alternative 1	Alternative 2	Alternative 3	Alternative 4
NCP EVALUATION CRITERIA	1 Protectiveness	Does Not Meet Criteria	Meets Criteria	Meets Criteria	Meets Criteria
	2 Compliance with ARARs	Does Not Meet Criteria	Meets Criteria	Meets Criteria	Meets Criteria
	3 Long-Term Effectiveness and Permanence	Does Not Meet Criteria	Meets Criteria	Meets Criteria	Meets Criteria
	4 Reduction in Toxicity, Mobility, Volume	May Meet Criteria	May Meet Criteria	Meets Criteria	Meets Criteria
	5 Short-term Effectiveness	Does Not Meet Criteria	Meets Criteria	May Meet Criteria	May Meet Criteria
	6 Implementability	Meets Criteria	Meets Criteria	Meets Criteria	May Meet Criteria
	7 Regulatory Acceptance	Does Not Meet Criteria	Meets Criteria	Meets Criteria	Meets Criteria
	8 Community Acceptance	Criteria Not Evaluated	Criteria Not Evaluated	Criteria Not Evaluated	Criteria Not Evaluated
	9 Cost ($million)	None	1.75	5.75	14.9
	Estimated Time to Cleanup	35 years	35 years	30 years	30 years

Meets Criteria May Meet Criteria Does Not Meet Criteria Criteria Not Evaluated

thus reducing the overall effectiveness of Alternatives 3 and 4.

Reduction in Toxicity, Mobility and Volume through Treatment. Alternative 1 does not include groundwater monitoring, so remediation cannot be documented. Alternative 2 monitors the natural attenuation process to confirm and document reductions in toxicity, mobility, and volume. Alternatives 3 and 4 provide more reduction in toxicity, mobility, and volume through pumping and subsequent treatment of extracted groundwater. Alternative 4 further reduces toxicity, mobility, and volume through treatment at off-Base permeable reactive barriers.

Short-Term Effectiveness (Impact on Community). Alternative 1 does not present a short-term risk or impact on the community because no action is taken, but no groundwater monitoring is performed to document remediation. Alternative 2 presents little short-term risk to the community or workers because no action is taken beyond groundwater sampling. Alternative 3 presents some short-term risk to workers during the construction of extraction wells and associated infrastructure. Alternative 4 presents significant short-term risk to workers and community during the construction of permeable reactive barriers in residential areas. The short-term risks would include traffic interruption/diversion, and some residents may need to be temporarily displaced during construction.

Implementability. Alternatives 1 and 2 are easily implemented, both technically and administratively. Alternatives 3 and 4 present some implementability issues related to construction of the extraction wells and associated infrastructure. Alternative 4 presents significant implementability issues related to construction since permeable reactive barriers have to be installed in residential streets that have high utility density.

Cost. Alternative 1 has no costs associated with it. Cost under Alternative 2 is associated with groundwater sampling. Cost associated with Alternative 3 includes groundwater sampling, installation of the extraction wells and associated infrastructure, and operation and maintenance of the system. Alternative 3 is more than three times the cost of Alternative 2. Alternative 4 is the most expensive because it includes all the costs under Alternative 3 plus the expense associated with the installation of permeable reactive barriers.

Regulatory Acceptance. The EPA and UDEQ have tentatively agreed with the preferred alternative (see discussion below). However, this is subject to change after considering public comments received on this Proposed Plan and until the final Record of Decision is signed for OU 5.

Community Acceptance. Public comment on this document will be evaluated to determine the community's acceptance of the preferred alternative, and documented in the Record of Decision for OU 5.

Preferred Zone 16 Alternative

Alternative 2 is the preferred alternative for the Zone 16 groundwater plume when compared to Alternatives 1, 3, and 4. Alternative 1 does not include institutional controls, therefore it is not protective because the use of groundwater would not be restricted and compliance with ARARs is not achieved. Alternative 2 is preferred because groundwater modeling and monitoring indicates that the plume is shrinking on its own. Alternatives 3 and 4 have potential problems associated with the groundwater extraction wells on the Base boundary impacting the TARS plume, and would only decrease remediation times by approximately 5 years. Additionally, Alternative 3 costs more than three times as much as Alternative 2, and Alternative 4, with the additional costs associated with the installation of permeable reactive barriers, costs more than eight times as much as Alternative 2.

Groundwater Monitoring

TARS Soil

The extent of arsenic contamination in soil, defined by arsenic exceeding a concentration of 50.9 milligrams per kilogram (the risk-based exposure concentration for a worker at TARS) encompasses an on-Base area of approximately 18,000 square feet (0.4 acres), as shown on Figure 4. No arsenic contamination was found off-Base. Of 52 soil samples analyzed for arsenic, 14 exceeded the exposure concentration of 50.9 milligrams per kilogram. However, arsenic was detected in soil at every location sampled since it is a common naturally occurring metal in Utah. The maximum detection of arsenic in soil was 203 milligrams per kilogram. The background level for arsenic on Hill AFB is 9.73 milligrams per kilogram.

Existing Remedial Actions

No remedial actions have been implemented for the TARS soil.

Institutional Controls

Soil On-Base. For soil, Hill AFB will be responsible for imposing soil restrictions that would limit access to contaminated soil. These on-Base institutional controls are implemented through Continuing Order AFI 32-7020 (Hill AFB supplement 1, 29 April 1998) which states that no construction or other activity will disturb soil in the restricted areas. Hill AFB will distribute a Restricted Areas Use Map to departments across the Base and will update and re-distribute the map as necessary. In addition, Hill AFB will review all completed 322 Process Forms for construction activities proposed in these restricted areas. Restricted areas like the arsenic-contaminated soil area within the TARS will be posted with warning signs and contact information. Annual institutional control audits including visual inspections will be used to assess compliance with institutional controls. Evaluation of institutional control effectiveness will be performed as part of the 5-year review process by Hill AFB.

TARS Soil Alternatives

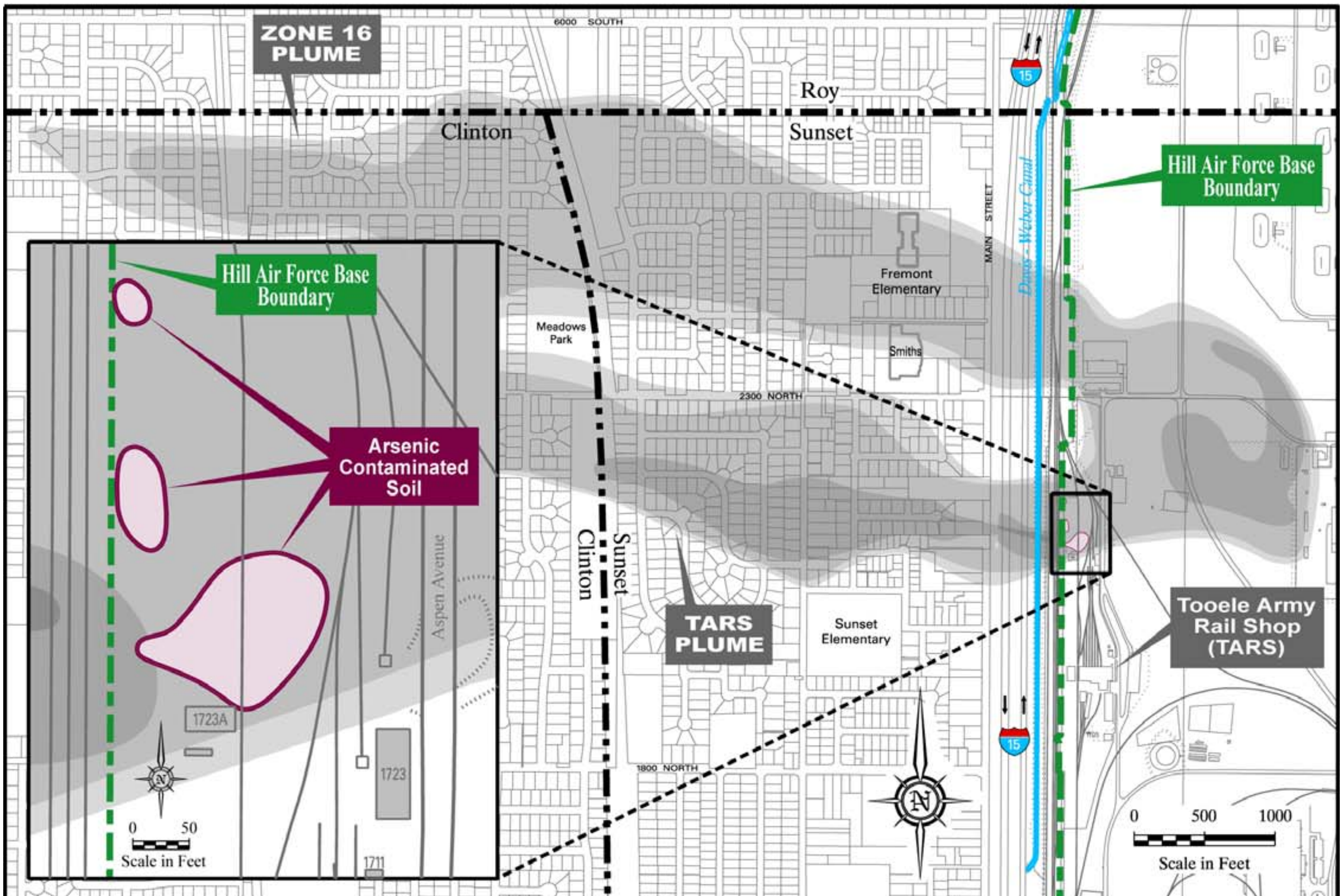
There are four remedial alternatives presented in this Proposed Plan for the TARS soil contamination. The alternatives are described and illustrated in Figure 4. Alternative 1 is a "no action" alternative and is provided as a baseline for comparison to the other alternatives.

TARS Soil Alternative 1. Under this alternative, no action would be taken to clean up the TARS soils and institutional controls would not be implemented.

TARS Soil Alternative 2. Under this alternative, institutional controls to restrict land use would be implemented across the area of contaminated soil.

Phase III Groundwater Containment System

FIGURE 4. TARS Soil Alternatives



ALTERNATIVE 1

No action.

Construction Cost	None	O&M Cost*	None	Present Worth**	None

ALTERNATIVE 2

Institutional controls to restrict land use would be implemented across the area of contaminated soil.

Construction Cost	None	O&M Cost*	None	Present Worth**	None

ALTERNATIVE 3

Institutional controls to restrict land use would be implemented across the area of contaminated soil. Alternative 3 would also include the installation of soil covers in areas with contaminated soil to prevent exposure to contamination.

Construction Cost	$126,000	O&M Cost*	$10,000	Present Worth**	$460,000

ALTERNATIVE 4

Alternative 4 would include the excavation of contaminated soil, with removal and disposal of the soil to an off-Base Resource Conservation and Recovery Act (RCRA) Subtitle C Hazardous Waste Landfill.

Construction Cost	$720,000	O&M Cost*	None	Present Worth**	$720,000

** Annual Cost* *** Calculated as 30 Year Present Worth*

TRICHLOROETHENE (TCE) CONCENTRATIONS IN GROUNDWATER (2002-2003)

- 5-10 ppb
- 10-100 ppb
- 100-1000 ppb
- 1000-5200 ppb

Soil area of attainment (defined by arsenic concentrations greater than 50.9 mg/kg)

mg/kg Milligrams per kilogram

Currently, access to areas at the TARS containing elevated concentrations of arsenic in soil is restricted to only a few TARS workers (i.e., access to this area is strictly controlled). The mission of this facility is to repair and overhaul train engines and large generators. These activities mostly occur indoors, which limits the time that a TARS worker would be outdoors and greatly reduces the possibility for soil to be ingested.

TARS Soil Alternative 3. Under this alternative, institutional controls to restrict land use would be implemented across the area of contaminated soil. Alternative 3 also includes the installation of a soil cover in areas with contaminated soil to prevent exposure to contamination.

TARS Soil Alternative 4. Under this alternative, all of the contaminated soil would be excavated and disposed at an off-Base Resource Conservation and Recovery Act (RCRA) Subtitle C Landfill. Institutional controls would not be needed because the contaminated soil would be removed.

Evaluation Criteria – Comparison of TARS Soil Alternatives

The four remedial alternatives for the TARS soil area were compared against the evaluation criteria presented in Table 2. A summary of the evaluation for the soil is described below and highlighted in Table 5.

Protectiveness. Alternative 1 does not provide full protectiveness because this alternative does not reduce contaminant concentrations in soil or include institutional controls that would restrict contact with the contaminated soil. Alternative 2 provides protectiveness through the implementation of institutional controls. Alternative 3 provides more protectiveness than Alternatives 1 and 2 by physically preventing human contact with contaminated soil through capping. Alternative 4 provides the most protectiveness by removing the contaminated soil and disposing it at an off-Base RCRA-permitted landfill.

Applicable or Relevant and Appropriate Requirements. Alternative 1 does not comply with regulations because contaminants will remain on site and no action is taken to mitigate or manage the associated risks. Alternatives 2 through 4 comply with applicable location-, chemical-, and action-specific regulations.

TABLE 5
TARS Soil Evaluation of Remedial Alternatives

	TARS SOIL	Alternative 1	Alternative 2	Alternative 3	Alternative 4
NCP EVALUATION CRITERIA	1 Protectiveness	Does Not Meet Criteria	Meets Criteria	Meets Criteria	Meets Criteria
	2 Compliance with ARARs	Does Not Meet Criteria	Meets Criteria	Meets Criteria	Meets Criteria
	3 Long-Term Effectiveness and Permanence	Does Not Meet Criteria	Does Not Meet Criteria	Meets Criteria	Meets Criteria
	4 Reduction in Toxicity, Mobility, Volume	Does Not Meet Criteria	Does Not Meet Criteria	May Meet Criteria	Meets Criteria
	5 Short-term Effectiveness	Does Not Meet Criteria	Meets Criteria	May Meet Criteria	May Meet Criteria
	6 Implementability	Meets Criteria	Meets Criteria	Meets Criteria	Meets Criteria
	7 Regulatory Acceptance	Does Not Meet Criteria	Meets Criteria	Meets Criteria	Meets Criteria
	8 Community Acceptance	Criteria Not Evaluated	Criteria Not Evaluated	Criteria Not Evaluated	Criteria Not Evaluated
	9 Cost ($million)	None	0.17	0.46	0.72

Meets Criteria | May Meet Criteria | Does Not Meet Criteria | Criteria Not Evaluated

There are several ARARs for soil contamination at the TARS area, including the following:

Corrective Action Clean-up Standards UST and CERCLA sites (UAC R311-211). This standard requires that action is taken to be protective, and requires source removal or control of the source to prevent further degradation of the environment.

Clean-up and Risk-Based Closure Standards- RCRA, UST, and CERCLA sites (UAC R315-101). This standard establishes requirements to support risk-based cleanup and closure standards at sites for which remediation or removal of hazardous constituents to background levels will not be achieved. The procedures in this rule also provide for continued management of sites for which minimal risk-based standards cannot be met, and requires removal or control of the source and non-degradation beyond existing contaminant levels.

Long-Term Effectiveness and Permanence. Alternatives 1 and 2 do not provide long-term effectiveness and permanence as no action is taken to reduce contaminant concentrations. The application of institutional controls in Alternative 2 would restrict future contact with contaminated soil as the restriction of land use would be undertaken and enforced by Hill AFB. Alternative 3 would provide long-term effectiveness and permanence, however long-term maintenance of the soil cap would be required. Alternative 4 would provide the most long-term effectiveness and permanence through excavation and off-Base disposal of contaminated soil.

Reduction in Toxicity, Mobility, and Volume through Treatment. Alternatives 1 and 2 do not reduce toxicity, mobility, or volume. Alternative 3 reduces mobility through capping. Alternative 4 provides the most reduction in toxicity, mobility, and volume through excavation and off-Base disposal of contaminated soil.

Short-Term Effectiveness (Impact on Community). Alternatives 1, 2, and 3 present little short-term risk, but Alternative 1 is not protective of human health. Alternative 4 presents some short-term risk to the community associated with the transport of contaminated soil from OU 5 to an off-Base RCRA-permitted landfill.

Implementability. Alternatives 1 through 4 are easily implemented, both technically and administratively.

Cost. Alternative 1 has no associated cost. Alternative 3 is three times the cost of Alternative 2 (the preferred alternative), and Alternative 4 is more than four times the cost of Alternative 2 (shown on Table 4 and Figure 4).

Regulatory Acceptance. The EPA and UDEQ have tentatively agreed with the preferred alternative (see discussion below). However, this is subject to change after considering public comments received on this Proposed Plan and until the final Record of Decision is signed for OU 5.

Community Acceptance. Public comment on this document will be evaluated to determine the community's acceptance of the preferred alternative, and documented in the Record of Decision for OU 5.

Preferred Soil Alternative

Alternative 2 is the preferred alternative for the TARS soil area when compared to Alternatives 1, 3, and 4. Alternative 1 does not provide institutional controls to restrict exposure to contaminated soil, nor does it reduce contaminant concentrations. Alternative 2 includes institutional controls to be enforced by Hill AFB to restrict land use and restrict future contact with contaminated soil. Alternative 3 prevents future contact with contaminated soil by installation of a soil cover. Alternative 4 includes removal of the contaminated soil, however the incremental benefit is not worth the cost (Alternative 3 costs three times that of Alternative 2 and Alternative 4 cost four and one half times that of Alternative 2).

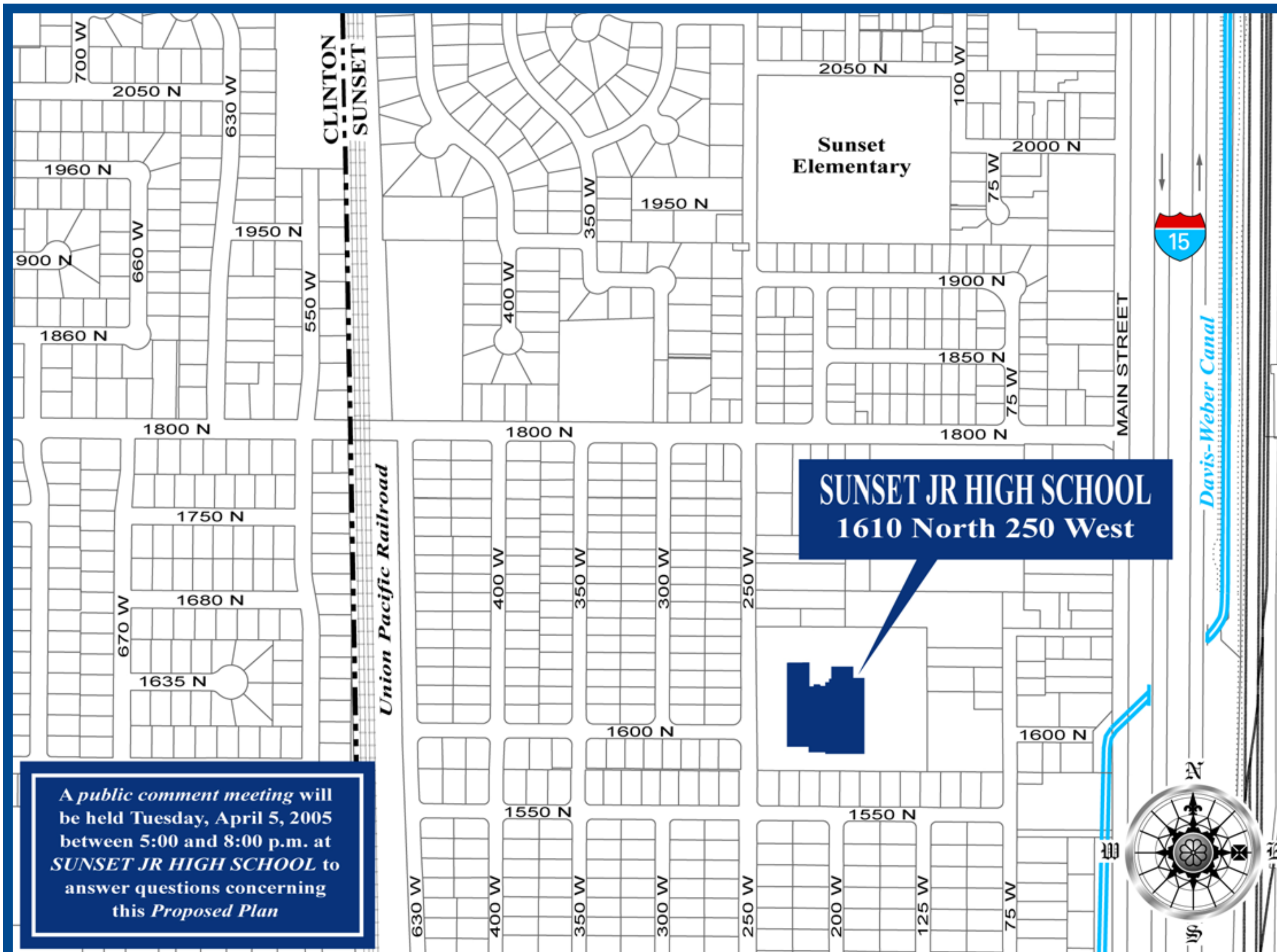
References

Hill Air Force Base, 2003. *Final Action Memorandum for Time-Critical Removal Actions for Indoor Air*. Hill Air Force Base, Utah. September 2003.

MWH, 2004. *Final Feasibility Study Report for Operable Unit 5*. Hill Air Force Base, Utah. May 2004.

MWH, 2003. *Final Remedial Investigation Report for Operable Unit 5*. Hill Air Force Base, Utah. September 2003.

Utah Division of Water Rights (UDWR), 1995. *Ground-Water Management Plan for the Weber Delta Sub-Area of the East Shore Area,* October 1995.



For more information on the Proposed Plan, or any of the supporting documentation, contact:

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